



Predictors of Friendship Quality in Adolescents with and without Attention-Deficit /Hyperactivity Disorder

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Abstract

The purpose of this study was to identify predictors of friendship quality in adolescents with and without ADHD. The participants were 115 adolescents (61 ADHD, 54 non-ADHD), ages 13–18. The adolescents completed questionnaires assessing the quality of their relationships with their best friends, social perspective taking, anxiety and depression. Their parents completed questionnaires assessing the adolescents' social skills, oppositional behaviors, and conduct problems. Being female was associated with higher levels of friendship quality. Although ADHD status did not predict friendship quality among 13–15 years old adolescents, having a diagnosis of ADHD was negatively associated with friendship quality among 16–18 years old adolescents. Friendship stability, anxiety, social perspective taking, and social skills were positive predictors of friendship quality over and above gender, age and ADHD status whereas oppositional behavior was a negative predictor of friendship quality. Social perspective taking mediated the relationship between friendship quality and anxiety and social skills mediated the relationship between oppositional behavior and friendship quality.

Keywords ADHD · Adolescents · Friendship quality · Social competence · Internalizing and externalizing behavior

Introduction

Friendships are voluntary, co-constructed relationships that are intimately linked with the social, emotional, and behavioral functioning of children and adolescents (for review, see Bagwell & Schmidt, 2011). Friendships provide children and adolescents with opportunities to resolve conflicts, practice cooperation, cultivate patience, develop social perspective-taking, and foster empathy. Close friendships during childhood and adolescence serve as a rubric for future interpersonal relationships that span the lifecycle and are associated with psychological wellbeing in adulthood (Hartup & Stevens, 1997). Friendship problems in childhood and adolescence foreshadow future negative outcomes

including academic difficulties, psychopathology, substance abuse, and sustained social difficulties (Bagwell & Schmidt, 2011). Studying friendships is also important because children and adolescents value them greatly (Mikami, 2010). As children and adolescents typically make friends with peers in their schools (Bagwell & Schmidt, 2011), and students who have few friends at school are at risk for mental health challenges (Becker et al., 2012), research on friendship has important implications for school mental health intervention.

High-quality friendships are characterized by high levels of prosocial behavior (e.g., intimacy, support, and validation) and low levels of negative behavior (e.g., conflict, criticism, aggression, rivalry). Whereas high-quality friendships have been generally linked to better relationship stability, relationship satisfaction, and psychological adjustment, low-quality friendships have been associated with negative outcomes (Bagwell & Schmidt, 2011). As described below, children and adolescents with ADHD have significant difficulties with peer relations (McQuade, 2020; McQuade & Hoza, 2015). Although there are several studies on the friendships of children with ADHD (e.g., Normand et al., 2011, 2013), there are only a few studies on friendship quality of adolescents with ADHD and these studies do not systematically examine predictors of the variability in their

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friendship quality. Consequently, the purpose of the present study was to examine predictors of friendship quality in adolescents with ADHD.

Friendships of Children and Adolescents with ADHD

It is well established that, compared to their typically developing (TD) counterparts, children and adolescents with ADHD are more frequently rejected, stigmatized, and victimized by their peers (McQuade, 2020; Timmermanis & Wiener, 2011; Wiener & Mak, 2009). Children with ADHD have fewer friends and more difficulty maintaining friendships across time than children without ADHD (Bagwell et al., 2001; Marton et al., 2015; Normand et al., 2013). In particular, less than half of children with ADHD have a reciprocated friend at school (Hoza et al., 2005). Their friendships are generally regarded as more conflictual and less intimate, supportive, cooperative, and satisfying than the friendships of TD children (e.g., Normand et al., 2011, 2013).

The existing studies, however, focus on children and the occurrence of friendships, while generally overlooking adolescent friendships and the potential mechanisms underlying the quality of these relationships. The handful of studies examining friendships in adolescents with ADHD suggest that these youth have fewer close friends at school (Bagwell et al., 2001), are more likely to experience peer dyadic loneliness (Al-Yagon, 2016), and have less supportive friendships (Rokeach & Wiener, 2020) than their TD peers. Although they are more likely than their TD counterparts to befriend peers who are age discrepant (i.e., younger or older) and who exhibit behavior difficulties (Maya-Beristain & Wiener, 2020a), they do not report higher levels of negative aspects of friendship quality such as conflict in their relationships (Rokeach & Wiener, 2020).

Factors Associated with Friendship Quality

Reviews of research on friendship suggest several factors that may be associated with variability in friendship quality in adolescents including age/development, gender, friendship stability, internalizing and externalizing behaviors, and social competence (Bagwell & Schmidt, 2011; McQuade, 2020).

Development

In many ways, early- versus late- adolescence are qualitatively distinct from one another in terms of biological, cognitive, and socio-emotional functioning (see Steinberg, 2005, for review). In early adolescence, youth are just beginning to negotiate puberty, their thinking remains somewhat concrete and present focused, and parents remain largely responsible

for many aspects of their day to day life (e.g., health, social lives). Because they also make the transition to middle and high school, their friendships become less stable. In contrast, in late adolescence, they have achieved puberty, they engage in more complex thinking and moral reasoning, and they develop cross-sex friendships and romantic relationship. Moreover, adolescents strive for increasing autonomy from their parents and they become more attached to their peer group (Allen, 2008). Although youth with and without ADHD appreciate having friends who are good companions (e.g., fun, mutually entertaining), this aspect of friendship quality is central for adolescents with ADHD (Gardner et al., 2019; Heiman, 2005). Typically developing adolescents, on the other hand, are more likely to value intimacy, empathic understanding, self-disclosure, and emotional support in their friendships (Berndt, 2004; Poulin & Chan, 2010). These differences in friendship values, in conjunction with the core symptom dimensions of ADHD (i.e., inattention and hyperactivity/impulsivity), may lead to friendships that are less supportive than those of their TD peers, particularly in late adolescence (McKee, 2017; Rokeach & Wiener, 2020). Rokeach and Wiener (2020) found that young adolescents (ages 13–15) with and without ADHD did not differ in their perceptions of the quality of support they receive from friends whereas older adolescents with ADHD (ages 16–18) reported lower quality relationships with their friends than adolescents without ADHD. There were no differences between adolescents with and without ADHD in terms of their reports of negative interactions with friends.

Gender

Research has firmly established that the interpersonal relationships of boys and girls are qualitatively different (see Rose & Rudolph, 2006 for review). Girls are typically more relationship-oriented; they tend to interact in small groups, and they value friendships based on intimacy, self-disclosure, and the enhancement of self-worth. Boys typically place greater emphasis on hierarchy and power dynamics, and they tend to engage in interactions that are activity-based and require large groups (Rose, 2007). As such, boys and girls may vary in their conceptualization of friendship quality. Nevertheless, based on the construct of friendship quality involving support and intimacy, there is a preponderance of research suggesting that girls have higher quality friendships than boys (e.g., Rose & Rudolph, 2006). Girls with ADHD, however, have been found to have higher levels of negative friendship features such as conflict (e.g., Maya-Beristain & Wiener, 2020a; Zucchetti et al., 2015), but comparable (Glass et al., 2012; Zucchetti et al., 2015) or higher (Rokeach & Wiener, 2020) levels of positive friendship features such as social support and intimacy in their relationships, when compared to their male counterparts.

Friendship Stability

High quality friendships tend to persist (Branje et al., 2007). Friendship stability and friendship quality tend to increase with age, as individuals increasingly seek stability in different facets of their lives (Poulin & Chan, 2010). Marton et al. (2015) found that children with ADHD (ages 8–12) reported friendships that were shorter in duration (i.e., length of reported friendships divided by age) than children without ADHD. Maya-Beristain and Wiener (2020a), however, found no differences in duration of friendships between adolescents with and without ADHD. Previous research has not investigated, however, whether friendship stability is associated with friendship quality among adolescents with ADHD.

Externalizing and Internalizing Behaviors

Nearly 50% of youth with ADHD also meet criteria for comorbid oppositional defiant disorder (ODD), conduct disorder (CD), anxiety disorder, or depressive disorder (Larson et al., 2011). Examinations of the unique contribution of ODD and CD on social impairment in youth with ADHD show either no effect or an additive effect (e.g., Booster et al., 2012). Findings with regards to internalizing symptomatology are muddled. Some research indicates that, over and above ADHD status, symptoms of depression and/or anxiety are associated with social impairment, (e.g., Becker et al., 2015), while other research suggests that, among youth with ADHD, internalizing symptomatology adds to social impairment only in the presence of externalizing behavior problems (e.g., Booster et al., 2012).

It is not clear how ADHD and comorbid externalizing or internalizing disorders may relate to friendship quality. Zucchetti et al. (2015) found that aggression and emotional and behavioral instability mediated the relationship between ADHD and conflict levels with best friends. Other studies found no additive effect of externalizing behavior problems on number of dyadic friendships (Hoza et al., 2005) and friendship quality (Normand et al., 2011) in children with ADHD. No studies were identified that examined the effect of comorbid depression on the friendships of youth with ADHD. The few studies examining co-occurring anxiety problems suggest they do not affect the ability of children with ADHD to make friends, nor the quality of these friendships (Becker et al., 2012; Hoza et al., 2005; Normand et al., 2011).

Social Competence

The development of high-quality friendships in adolescence is associated with social skills and social perspective-taking abilities (Nelson & Crick, 1999). Social skills describe a class of verbal and non-verbal behaviors that individuals

exhibit to elicit socially desirable outcomes (Gresham et al., 2010). Gresham and Elliott (2008) identified seven domains of social skills: communication, cooperation, assertion, engagement, self-control, empathy, and responsibility, with a number of these domains being positively associated with friendship quality (e.g., Chow et al., 2013). Children and adolescents with ADHD have poorer social skills than their typically developing peers (e.g., Kawabata et al., 2012). Consequently, individuals with ADHD may not have the skills needed to provide emotional support, manage conflicts, or to carefully balance intimate exchanges in a manner conducive to forming and maintaining high quality relationships (Bagwell & Schmidt, 2011).

Social perspective taking, which is the ability to understand a situation from another's perspective and engage in social problem solving based on that understanding (Selman, 1971), is associated with social skills and development of positive social relationships (Adalbjarnardottir, 1995). Children and adolescents with ADHD have less developed social perspective taking abilities than their TD peers (Bora & Pantelis, 2016; Marton, et al., 2009) and these difficulties contribute to their challenges with peer relations including stability of friendship (Bora & Pantelis, 2016; Marton et al., 2015; Mikami et al., 2008).

Theoretical Framework: Developmental Cascades

Traditionally, researchers examining the interplay between specific domains of competence and symptoms of psychopathology based their studies on a medical model; they assumed that impairments in major competence domains (e.g., interpersonal skills) are the result of, rather than contributors to, symptoms of psychopathology (Burt & Roisman, 2010). More recent research has highlighted the nuanced ways in which these constructs influence each other in a bi-directional manner. Children with limited social competence have fewer positive interactions with their environment and, as a result, develop externalizing and internalizing behavior problems (e.g., Parker et al., 2006; Rubin, Bukowski, et al., 2006; Rubin, Wojslawowicz, et al., 2006), which then may further undermine the development of interpersonal competence and successful relationships (Masten et al., 2005).

Accordingly, some investigators have adopted a developmental cascades analytical approach to examine how difficulties in one area of functioning, such as externalizing behavior problems, can spill over into other areas of competence across time (Masten et al., 2005; Murray-Close et al., 2010). Their research suggests that the peer relationship problems of children with ADHD may arise from a failure to negotiate other important developmental tasks (e.g., emotional regulation) across the lifespan. Murray-Close et al. (2010), for example, found that children with ADHD who

participated in the Multimodal Treatment Study exhibited more social skills problems and aggression than their TD peers and that the challenges in each of these areas predicted increases in problems in the other areas across development (ages 8–18). It is important to note that as the current study uses a cross-sectional design, it was not possible to employ longitudinal structural equation modeling to parse out the directionality of effects. It is, however, an important first step in attempting to understand the relationship between ADHD, comorbidity, interpersonal competence, and friendship quality.

Study Objectives

The overall purpose of this study was to investigate whether friendship stability, oppositional behavior, anxiety, social skills and social perspective taking predict adolescent friendship quality over and above ADHD status, adolescent age group, and gender. The first objective was to confirm the findings from previous research that 16–18 years old adolescents with ADHD report lower friendship quality than their counterparts without ADHD but that there are no differences in friendship quality between 13 and 15 years old adolescents with and without ADHD (Rokeach & Wiener, 2020). It was therefore expected that age group would moderate the association between ADHD status and predict friendship quality. Similarly, due to findings that females, including females with ADHD, reported higher friendship quality than males (Rokeach & Wiener, 2020; Rose & Rudolph, 2006), it was expected that female gender would be positively associated with friendship quality. The second objective was to examine whether friendship stability predicted friendship quality. Based on existing research with TD youth (Branje et al., 2007), it was predicted that friendship stability would explain additional variance in friendship quality over and above ADHD status, gender and age. The third objective was to examine whether parent-reported adolescent oppositional behavior and adolescent-reported anxiety and depressive symptoms would be associated with friendship quality. Based on previous research (e.g., Booster et al., 2012), it was expected that oppositional behavior would have an additive and adverse effect on friendship quality, but it was not clear whether depressive and anxiety symptoms would explain unique variance in friendship quality above age, gender, and ADHD status. The fourth objective was to determine whether social skills and social perspective taking would explain unique variance in the prediction of friendship quality over and above the variance accounted for by gender, age, ADHD status, friendship stability, and internalizing and externalizing behavior. It was expected that social skills and social perspective taking would be positively associated with friendship quality (Adalbjarnardottir, 1995; Chow et al., 2013; Nelson & Crick, 1999) but it was not clear whether

these social competence variables would predict unique variance over and above these other variables.

Method

Participants

A sample of 123 adolescents (67 ADHD, 56 Comparison), ages 13–18, were recruited from a large urban area in Canada to participate in the study. Six participants with an existing ADHD diagnosis were excluded from further analyses because they no longer exhibited clinical levels of ADHD symptoms ($n = 3$), or because their abbreviated IQ scores were below a standard score of 80 ($n = 3$), as assessed by the *Wechsler Abbreviated Scale of Intelligence* (WASI; Wechsler, 1999). Two comparison participants were excluded because of elevated levels of ADHD symptomatology. Thus, the final sample comprised 115 adolescents (65 boys, 50 girls). Sixty-one participants had a diagnosis of ADHD (age 13–15, $n = 33$; age 16–18 $n = 28$) and 54 adolescents (age 13–15, $n = 25$; age 16–18, $n = 29$) without a diagnosis of ADHD served as a comparison group. Among the adolescents with ADHD, 43 (70%) adolescents were taking medication to manage their ADHD symptoms.

The adolescents who were classified as having ADHD were required to have received a diagnosis of ADHD from a physician or psychologist. To ensure the ongoing manifestation of clinical levels of ADHD symptomatology, participants and their parents and teachers were also asked to complete the *Conners Rating Scales-Third Edition* (CRS; Conners, 2008). ADHD status was confirmed in one of two ways: a) participants had at least one parent rating within the clinically significant range ($T \geq 70$) on the DSM-IV Inattentive or DSM-IV Hyperactive /Impulsive scales of the CRS ($n = 58$); or b) participants had at least one borderline rating ($T \geq 65$) by a parent and a second informant (teacher or self-report) ($n = 3$). For inclusion in the comparison sample, participating adolescents were required to have no diagnosis of ADHD. Additional eligibility criteria for the comparison sample included (1) parent ratings in the average range ($T \leq 60$) on the DSM-IV oriented ADHD subscales ($n = 52$); or (2) all scores below the borderline range ($T \leq 64$) on teacher, parent, and self-reported ratings on the DSM-IV oriented ADHD subscales ($n = 2$).

Roughly two-thirds (69%) of the ADHD sample ($n = 42$) had at least one comorbid diagnosis from a mental health professional (learning disabilities, $n = 38$; anxiety disorder, $n = 7$; mood disorder, $n = 2$; oppositional defiant disorder, $n = 1$; and conduct disorder, $n = 1$). Among adolescents without ADHD, 8 (15%) had been diagnosed with a learning and/or mental health disorder (learning disability, $n = 7$; anxiety disorder, $n = 1$; oppositional defiant disorder, $n = 1$).

As shown in Table 1, *T*-tests revealed no significant differences between adolescents with and without ADHD in age or IQ. Unsurprisingly, participants with ADHD had higher scores on variables measuring inattentive and hyperactive/impulsive symptoms and oppositional defiant behavior and conduct problems. Participants with ADHD also rated themselves as manifesting more depressive symptoms, but comparable levels of anxious symptoms to their TD peers (see Table 1). Chi-square tests revealed that there was a higher proportion of male adolescents in the ADHD group ($n=40$; 66%) than in the comparison group ($n=25$; 46%), $X^2(1, N=115)=4.33, p=0.04$. There were no significant group differences in parent educational attainment $X^2(1, N=90)=0.12, p=0.73$, parent marital status $X^2(1, N=115)=0.71, p=0.4$, parent country of birth, $X^2(1, N=111)=2.17, p=0.14$, or the language spoken at home, $X^2(1, N=115)=0.96, p=0.33$.

Measures

The *Networks of Relationships Inventory–Behavioral Systems Version* (NRI-BSV; Furman & Buhrmester, 2009) was administered to assess self-reported perceptions of friendship quality and friendship stability. The NRI-BSV is a 24-item survey, with 8 scales and 3 items per scale.

Participants rate each item on a 5-point Likert scale from 1 (*little or none*) to 5 (*the most*). Prior to completing the 24 items, participants identified their mother and father figures, romantic partner, same sex and other sex closest friend. With regard to their closest friends, they rated the extent to which the relationship was important to them and whether this person was their “best friend”. They then indicated how long they were friends in years and months. Only data regarding the best friend is reported in this study. The NRI-BSV has two second order factors: Social Support, which has five scales (Seeks Secure Base, Seeks Safe Haven, Provides Secure Base, Provides Safe Haven, Companionship) and Negative Interaction, which has three scales (Conflict, Antagonism, Criticism). The scores for the Social Support and Negative Interactions factors are computed by obtaining the mean of the five support and three negative interactions scales, respectively. Sample items from the NRI Social Support factor include: *How much do you turn to this person (does this person turn to you) for support when you/ (he/she) are troubled about something? How often do you and this person go places and do enjoyable things together?* Sample items from the NRI Negative Interactions factor include: *How much do you and this person say mean or harsh things to each other? How often do you and this person argue with each*

Table 1 Sample Characteristics

Child characteristics	ADHD		Comparison		<i>t</i>
	<i>n</i>	<i>M</i> (SD)	<i>n</i>	<i>M</i> (SD)	
Age	61	15.28 (1.54)	54	15.41 (1.75)	0.42
IQ	61	106.69 (11.69)	54	110.31 (8.89)	1.83
<i>CRS parent</i>					
DSM inattentive	61	80.38 (8.07)	54	49.04 (6.26)	23.04***
DSM hyperactive-impulsive	61	80.11 (10.74)	54	48.37 (5.94)	19.25***
DSM oppositional/defiant	61	68.07 (12.43)	54	49.85 (7.15)	9.46***
DSM conduct disorder	61	59.57 (13.69)	54	48.28 (8.43)	5.22***
<i>CRS teacher</i>					
DSM inattentive	46	62.28 (12.41)	43	51.84 (11.18)	4.16***
DSM hyperactive-impulsive	45	59.78 (14.53)	43	52.84 (13.63)	2.31*
DSM oppositional/defiant	46	61.78 (18.27)	43	57.26 (16.06)	1.23
DSM conduct disorder	43	54.33 (14.14)	42	50.17 (11.33)	1.49
<i>CRS self-report</i>					
DSM inattentive	61	64.56 (10.57)	53	53.72 (11.15)	5.32***
DSM hyperactive-impulsive	61	63.34 (12.53)	53	51.85 (10.43)	5.27***
DSM oppositional/defiant	61	54.41 (9.73)	53	49.21 (8.21)	3.06**
DSM conduct disorder	61	54.05(11.15)	53	49.30(9.41)	2.43*
<i>RCADS</i>					
Depressive symptoms	61	53.03 (9.47)	54	46.39 (9.71)	13.76**
Anxious symptoms	61	46.64 (9.70)	54	43.98 (9.88)	2.11

CRS Connors rating scales; *DSM* Diagnostic and statistical manual of mental disorders; *RCADS* Revised child anxiety and depression scales. Scores on the *CRS* and *RCADS* are *T*-scores

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

other? The Social Support and Negative Interactions factors demonstrate strong internal consistency for same- and other-sex friends. Test–retest reliability for this measure is moderate, with stability of scores over 1 year at 0.66 for same-sex friendships and 0.75 for other-sex friendships. Construct validity of the NRI-BSV has been established by correlating coders' ratings of observed interactions and adolescents' ratings of their relationships with friends (Furman & Buhrmester, 2009). For the current study, internal consistency was strong (Social Support: $\alpha = 0.95$; Negative Interactions $\alpha = 0.91$). Friendship stability was calculated by dividing the reported length of the friendship in years by the adolescents' age.

The long forms of the *Conners Rating Scales-Third Edition* (Conners, 2008; Parent- Conners 3-P, Teacher- Conners 3-T, Self-report- Conners 3-SR) were used to assess ADHD symptomatology (i.e., inattention and hyperactivity/impulsivity), as well as oppositional defiant behavior and conduct problems. The Conners' scales are a well-validated standardized measure consisting of 99–115 items on a 4-point Likert scale from 0 (*Not at all/Seldom, Never*) to 3 (*Very Much True/Very Often, Very Frequent*). The DSM-IV subscales (DSM-IV Inattention, DSM-IV Hyperactive/Impulsive, DSM-IV Oppositional Defiant Disorder, DSM-IV Conduct Problems) demonstrate good internal and test–retest reliability (Conners, 2008). For the current sample, internal consistency was strong for the two DSM-IV ADHD subscales and the ODD and CD subscales (parent, teacher, self-report) (all $\alpha > 0.80$).

Parent reported social skills were assessed using the *Social Skills Improvement System (SSIS)* (Gresham & Elliott, 2008). Parents rated the frequency with which their children demonstrate a variety of positive social behaviors while interacting with others on a 4-point scale from 0 (*Never*) to 3 (*Almost Always*). The SSIS has seven domain subscales including communication, cooperation, assertion, engagement, self-control, empathy and responsibility, and a composite Total Social Skills score. Only the Total Social Skills score was used. The SSIS is a technically sound measure with high internal consistency for the Total Social Skills score (standardization sample: $\alpha = 0.95$; current study $\alpha = 0.89$).

Self-reported anxiety and depression were assessed by administering the *Revised Child Anxiety and Depression Scales (RCADS)* (Chorpita et al., 2000). The RCADS is a 47-item self-report questionnaire with a number of scales assessing a variety of anxiety and mood disorders. Participants rated the frequency with which each item applies to them on a 4-point Likert scale ranging from 0 (*never*) to 3 (*always*), with higher values indicating greater impairment. The RCADS has been shown to have good internal consistency, test–retest reliability, and convergent and discriminant validity (Chorpita et al., 2000). In the present sample, the

total Anxiety ($\alpha = 0.86$) and total Depression ($\alpha = 0.89$) scales also demonstrated strong internal consistency.

The *Interpersonal Reactivity Index (IRI)* (Davis, 1980) was used to assess self-reported social perspective taking. The IRI is a 28-item instrument scored on a Likert-type scale ranging from 0 (*doesn't describe me at all*) to 4 (*describes me very well*). The IRI has four subscales: social perspective taking, empathic concern, personal distress, and fantasy. The IRI was conceptualized to evaluate each subscale separately because the instrument was not intended to measure overall empathy. For the present study, only the social perspective taking scale was used in the analyses, with a higher value indicating greater self-reported perspective taking. Sample items from the IRI social perspective taking scale include: *I sometimes try to understand my friends better by imagining how things look from their perspective; When I'm upset at someone, I usually try to "put myself in his shoes" for a while; If I'm sure I'm right about something, I don't waste much time listening to other people's arguments*. The IRI has been shown to have solid psychometric properties (Davis, 1980). For the current sample, internal consistency ($\alpha = 0.76$) was adequate for the Social Perspective Taking subscale.

Procedures

Institutional ethic's board approval was obtained from the University of Toronto. Participants were recruited through advertisements in community newspapers and websites. To recruit adolescents with ADHD, brochures were also distributed to psychologists' and physicians' offices and children's mental health centers. During a phone screening, parents of participating adolescents were given detailed information about the study and asked questions about the demographics of their families. On the day of testing, participants and their parents provided informed written consent. Graduate students in school and clinical psychology assisted participants in completing an individually administered battery of self-report measures and standardized tests and parents completed the parent-report measures.

Data Analyses

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 22. The data were examined for outliers, and when detected, data points with SDs larger than 3 were adjusted using the Winsorizing method. Multiple imputation procedures (Graham, 2009) were employed to handle missing data points for the variable *social skills*, where less than 10% of the data was missing at random. The data points for all other variables were complete. Statistical assumptions checking for linearity, normality, collinearity, and homoscedasticity were met

in all analyses. Descriptive statistics were calculated for the demographic characteristics of the ADHD and comparison groups separately (see Table 1).

Potential predictors of friendship quality were examined through Pearson correlations. A hierarchical multiple regression analysis was conducted to predict supportive friendship quality. In order to confirm results from the Rokeach and Wiener (2020) study that girls have higher supportive friendship quality than boys, and that age group moderates the association of ADHD status and friendship quality, adolescent gender, age, ADHD status, and the interaction term ADHD*age were entered in Step 1. Other variables that were not correlated with friendship quality were not included in the regression analyses. Friendship stability was entered in Step 2. Oppositional defiant behavior and anxiety were entered in Step 3 and social skills and social perspective taking were entered in step 4. Multicollinearity was not a concern (i.e., all variance inflation factors (VIF) < 3).

Results

All of the adolescents reported having a best friend, with 110 out of 115 participants rating their same-sex friend to be their best friend. Adolescents with ADHD ($m=0.37$, $SD=0.04$) and without ADHD ($m=0.34$, $SD=0.03$) had comparable levels of self-reported friendship stability, calculated by dividing the reported length of their best friendship in years by the adolescents' age, $t(113)=-0.46$, $p=0.64$.

With regard to the Social Support scale on the NRI-BSV, as shown in Table 2, gender was negatively correlated with ratings of friendship quality, such that males rated their friendships to be less supportive than females. Friendship quality was not significantly correlated with age and ADHD status. Friendship stability, self-reported anxiety social perspective taking, and parent-rated social skills were positively associated with friendship quality. Parent rated oppositional defiant behavior was negatively correlated with friendship quality. Parent rated conduct problems and self-reported depression levels were not significantly correlated with friendship quality and were therefore not included in subsequent analyses. None of the variables were correlated with the Negative Interactions scale on the NRI-BSV (Table 2). As a result, hierarchical regression analyses were confined to supportive aspects of friendship quality.

As shown in Table 3, when the combination of gender, age, ADHD status, and age*ADHD status variables were entered in the first step, they explained 14% of the variance in friendship quality, $R^2=0.14$, $F(4, 110)=4.42$, $p=0.002$, though gender ($p=0.002$) and age*ADHD status ($p=0.036$) were the only significant predictors. Friendship stability was entered into the next step of the regression and it explained an additional 5% of the variance, $R^2\ change=0.05$, $F(5, 109)=5.19$, $p<0.001$. Anxiety and oppositional behavior were entered into step 3 of the regression and they were both significant predictors of friendship quality. Specifically, anxiety was positively associated with friendship quality ($p=0.05$) and oppositional behavior was negatively associated with friendship quality ($p=0.041$). Together they

Table 2 Bivariate Correlations between Friendship Quality on the NRI-BSV, demographic variables, internalizing and externalizing behavior and social competence

	Total sample $N=115$		ADHD $N=61$		Comparison $N=54$	
	Social support	Negative interactions	Social support	Negative interactions	Social support	Negative interactions
ADHD status	-0.138	-0.001				
Gender	-0.303**	0.125	-0.259*	0.140	-0.314*	0.114
Age	-0.021	-0.061	-0.217	-0.148	0.190	0.045
Friendship stability	0.215*	-0.082	0.243	0.044	0.198	-0.248
Social skills	0.307**	-0.004	0.184	0.008	0.382*	-0.019
SPT	0.327**	-0.111	0.429**	-0.090	0.177	-0.149
Anxiety	0.166 ^a	0.093	0.139	-0.003	0.247	0.212
Depression	0.006	0.017	-0.088	-0.092	0.015	0.182
Oppositional behavior	-0.244**	-0.015	-0.315*	-0.007	-0.006	-0.039
Conduct disorder	-0.103	0.039	-0.005	0.162	0.083	-0.199

ADHD Status (Comparison = 0, ADHD = 1); Gender (Male = 0, Female = 1); Friendship quality calculated by summing subscales of social support and negative interactions scales on the NRI-BSV; SPT = Social perspective taking

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

^a $p=0.06$

Table 3 Hierarchical regression predicting supportive friendship quality (NRI-BSV)

Predictors	R^2	ΔR^2	B	SE (B)	B
<i>Step 1</i>	0.14	0.05			
Gender			− 0.558	0.177	− 0.288**
Age			0.250	0.251	0.130
ADHD			0.195	0.243	0.101
ADHD*Age			− 0.727	0.343	− 0.324*
<i>Step 2</i>	0.19	0.05			
Gender			− 0.557	0.172	− 0.287**
Age			0.325	0.246	0.169
ADHD			0.209	0.237	0.109
ADHD*Age			− 0.787	0.334	− 0.351*
Friendship stability			0.842	0.312	0.234**
<i>Step 3</i>	0.26	0.07			
Gender			− 0.465	0.169	− 0.240**
Age			0.351	0.238	0.183
ADHD			0.483	0.272	0.250
ADHD*Age			− 0.786	0.323	− 0.351*
Friendship stability			0.965	0.305	0.268**
Anxiety			0.018	0.008	0.188*
Oppositional behavior			− 0.019	0.008	− 0.267*
<i>Step 4</i>	0.33	0.07			
Gender			− 0.388	0.165	− 0.200*
Age			0.344	0.229	0.179
ADHD			0.540	0.271	0.280
ADHD*Age			− 0.832	0.312	− 0.371**
Friendship stability			0.812	0.299	0.225**
Anxiety			0.012	0.008	0.142
Oppositional behavior			− 0.009	0.008	− 0.132
Social skills			0.011	0.005	0.209*
Social perspective taking			0.037	0.016	0.194*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

explained an additional 7% of the variance, R^2 change = 0.07, $F(7, 107) = 5.41, p < 0.001$. Finally, social skills and social perspective taking were simultaneously entered in the fourth and final step of the regression. Together they explained an additional 7% of the variance, R^2 change = 0.07, $F(9, 105) = 4.96, p < 0.009$. In total, this model explained 33% of the variance in friendship quality. In this final step, social skills ($p = 0.04$) and social perspective taking ($p = 0.02$) were significant predictors of friendships quality, but anxiety ($p = 0.14$) and oppositional behavior ($p = 0.26$) no longer significantly predicted friendship quality over and above social skills, social perspective taking, friendship stability, ADHD*Age, and gender.

Although not hypothesized, given that oppositional behavior and total anxiety no longer predicted friendship quality when simultaneously examining the contribution of social skills and social perspective taking, two mediation analyses were tested using bootstrapping techniques with bias-corrected confidence estimates (Preacher & Hayes,

2008). The 95% confidence interval (CI) of the indirect effect was obtained with 5000 bootstrapped re-samples. Exploratory regression analyses were used to investigate whether social skills mediated the effect of oppositional behavior on friendship quality and whether social perspective taking mediated the effect of anxiety on friendship quality, after controlling for gender, age, ADHD status, age*ADHD status, and friendship stability.

Oppositional behavior was a significant predictor of social skills, $b = -0.54, SE = 0.14, t(108) = -3.75, p < 0.001$ (Path A); social skills was a significant predictor of friendship quality, $b = 0.01, SE = 0.01, t(107) = 2.34, p = 0.02$ (Path B); and oppositional behavior significantly predicted friendship quality, $b = -0.02, SE = 0.01, t(108) = -2.24, p = 0.02$ (Path C). This analysis confirmed the mediating role of social skills in the relationship between oppositional behavior and friendship quality ($b = -0.01, SE = 0.003, CI -0.02$ to -0.001) as the confidence interval did not include 0. Results indicated that the direct effect of oppositional behavior

was no longer a significant predictor of friendship quality after controlling for the mediator, social skills, $b = -0.01$, $SE = 0.01$, $t(107) = -1.36$, $p = 0.18$ (Path C) (see Fig. 1a).

Anxiety was a significant predictor of social perspective taking, $b = 0.11$, $SE = 0.05$, $t(108) = 2.27$, $p = 0.02$ (Path A); social perspective taking was a significant predictor of friendship quality, $b = 0.05$, $SE = 0.02$, $t(107) = 2.79$, $p = 0.006$ (Path B); and anxiety significantly predicted friendship quality, $b = 0.02$, $SE = 0.01$, $t(108) = 2.04$, $p = 0.04$ (Path C). The mediation analysis confirmed the mediating role of social perspective taking in the relationship between anxiety and friendship quality ($b = 0.01$, $SE = 0.002$, CI 0.001–0.012) as the bias corrected confidence intervals did not contain 0. Results indicated that the direct effect of anxiety was no longer a significant predictor of friendship quality after controlling for the mediator, social perspective taking, $b = 0.01$, $SE = 0.01$, $t(107) = -1.46$, $p = 0.15$ (Path C') (see Fig. 1b).

Discussion

This study represents an initial foray into correlates of friendship quality in adolescents with and without ADHD. As previously found by Rokeach and Wiener (2020), age group (13–15; 16–18) moderated the association between ADHD status and the Social Support scale of friendship quality. Similar to previous research, for participants with

and without ADHD, female gender was positively associated with supportive friendship quality (Rokeach & Wiener, 2020; Rose & Rudolph, 2006) and friendships that were of longer duration were higher in social support (Branje et al., 2007). In the current study, oppositional behavior was negatively associated with supportive friendship quality whereas anxiety was positively associated with supportive friendship quality. Social skills and social perspective taking were associated with higher supportive friendship quality. Social skills mediated the relationship between adolescents' oppositional behavior and supportive friendship quality and social perspective taking mediated the relationship between adolescent anxiety and supportive friendship quality. None of the variables considered in the current study predicted negative interactions in friendships.

The moderating effect of age group in terms of the association of ADHD and friendship quality confirms the finding of Rokeach and Wiener (2020) that 16–18 years old adolescents with ADHD reported lower friendship quality than their counterparts without ADHD whereas there were no differences in self-reported friendship quality in 13–15 years old teens. As discussed by Rokeach and Wiener (2020), this finding extends that of other studies showing that children with and without ADHD do not differ in positive aspects of friendship quality (Normand et al., 2013), whereas undergraduate students with ADHD reported more difficulty providing support to friends than students without ADHD (McKee, 2017). The finding that ADHD status does not predict friendship quality in younger teens, however, might be due to it being measured by self-report. Several previous studies have found that children and young adolescents with ADHD have a self-enhancement bias; they over-estimate their positive characteristics (see Colomer et al., 2016 for review). It is possible that if friendship quality were assessed by friend, parent or teacher report, ADHD status would predict friendship quality in young adolescents as well.

The findings in the current study that were not established in previous published research are that oppositional behavior, anxiety, social skills and social perspective taking are correlates of positive aspects of friendship quality and that none of these variables are correlated with negative aspects of friendship quality. Co-occurring oppositional behavior has been found to exacerbate social impairment in youth with ADHD (e.g., Becker et al., 2015; Booster et al., 2012). Available research, however, has found no additive effect of externalizing behavior problems on measures of friendship quality in children with ADHD (Bagwell et al., 2001; Hoza et al., 2005; Normand et al., 2011). Companionship is the central feature of friendship quality in children whereas in older adolescents, intimacy and providing and receiving emotional support are of more importance (Bagwell & Schmidt, 2011). Children and adolescents with ADHD typically are friends with others who have learning and behavior

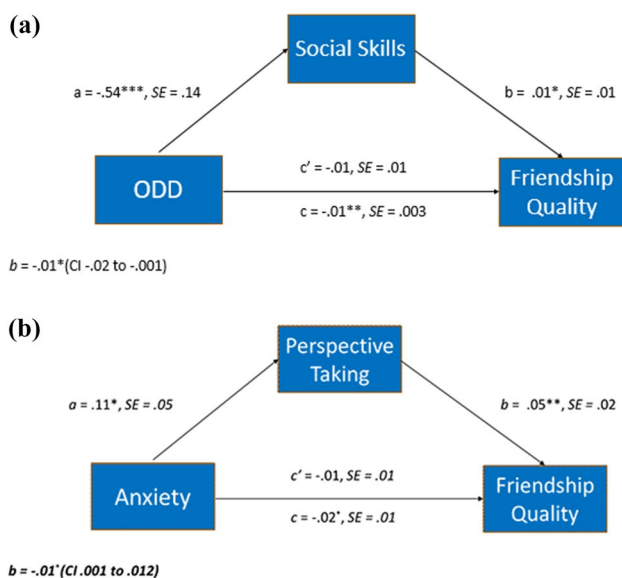


Fig. 1 a Indirect Effect of Oppositional Behavior (CRS) on Supportive Friendship Quality (NRI-BSV) through Social Skills (SSIS). b Indirect Effect of Anxiety (RCADS) on Supportive Friendship Quality through Social Perspective Taking (IRI). Gender, Age, ADHD status, Age*ADHD status, Friendship Stability were entered as covariates

problems (Marton et al., 2015; Maya-Beristain & Wiener, 2020a). If companionship is the central aspect of the friendship quality of children, and if both members of the dyad have high levels of externalizing behaviors, they may be able to spend time together doing activities of mutual interest, but they may not have the social skills needed to provide emotional support. This explanation is supported by the finding that social skills fully mediates the association between oppositional behavior and supportive friendship quality. It is more difficult to interpret the non-significant correlation between parent-reported oppositional behavior and self-reported negative interactions in friendships. A plausible explanation is that adolescents with ADHD who engage in high levels of oppositional behavior tend to under-report the extent of their difficulties (Colomer et al., 2020); this might also apply to their reports of negative interactions with friends.

It is well established that ADHD symptomatology and oppositional behavior are associated with deficits in social skills (e.g., Kawabata et al., 2012; Thomas et al., 2011). Findings suggest that social skills play a central role in determining friendship quality in adolescents with ADHD. It is possible that the relationship between social skills, friendship quality, ADHD, and oppositional symptoms interact in a recursive loop; symptoms associated with ADHD and oppositional symptoms hinder children's and adolescents' ability to develop friendships, which limits the opportunity to cultivate their social skills and social perspective taking, which then leads to more impoverished friendships (Bagwell et al., 2001; Mikami & Hinshaw, 2006; Murray-Close et al., 2010). However, it is also possible that ADHD symptoms predispose children to have difficulty acquiring age-appropriate social skills. In turn, this may lead to more negative interactions with their environment and contribute to subsequent feelings of frustration and aggression (Rubin, Bukowski, et al., 2006; Rubin, Wojslawowicz, et al., 2006).

Anxiety symptoms were positively associated with supportive friendship quality. This finding is contrary to previous research that suggests that comorbid anxiety has either no effect or an additive and detrimental effect on the social relationships of youth with ADHD (Becker et al., 2012; Hoza et al., 2005; Normand et al., 2011). Findings from this study, however, suggest that social perspective taking may account for the relationship between co-occurring anxiety symptoms and friendship quality. Social perspective taking is generally considered to be an adaptive skill. It is associated with affective empathy, social skills, peer acceptance, high quality relationships, and the development of conflict negotiation strategies (Rose et al., 2007). Despite its reputed benefits, social perspective taking may also have emotional costs. According to Rose et al., when youth with well-developed social perspective-taking skills encounter a friend who is troubled or upset, the tendency to take the friend's perspective may

increase the likelihood of sharing in their friend's affective state. This heightened sensitivity in interpersonal relationships may promote close friendships but may also create a greater risk for internalizing distress. Closely related to social perspective taking is the construct of co-rumination, or excessively discussing, rehashing, and speculating about problems and dwelling on negative affect (Rose, 2002). Because co-rumination involves a perseverative focus on problems within a dyad, it may lead to feeling understood and more anxious all at once. Indeed, Rose (2002) found co-rumination to be positively associated with friendship quality and internalizing symptoms.

Limitations of the Study

Current findings should be considered in light of some limitations of the study. The main limitation was that friendship quality was assessed through self-report only. Partners in friendship dyads often have differing views regarding the quality of their relationship (e.g., Normand et al., 2013). Moreover, children and younger adolescents with ADHD tend to provide inflated estimations of their competence and under-report problem areas in their lives, especially as it pertains to their social competence (e.g., Colomer et al., 2016, 2020). Consequently, it is possible that the finding of differences in positive features of friendship quality between younger but not older adolescents with and without ADHD was due to inflated reports of friendship quality among the younger adolescents with ADHD. Future studies should employ a multi-method, multi-informant assessment of friendship stability and friendship quality that includes seeking the reports of the friends of the adolescents in the sample.

Second, consistent with most of the research on friendships of children and adolescents with ADHD completed to date, this study examined correlations and consequences through a cross-sectional design, rather than investigating potential causal mechanisms and pathways longitudinally. Subsequent studies in this line of research should employ a developmental model that investigates these associations across time. This may help to elucidate the potential cascade effects of adaptive and maladaptive behaviors over time. Third, the sample size of this study was insufficient to examine whether ADHD status moderated the association between the psychopathology and social competence variables and friendship quality in the hierarchical regression analysis shown in Table 3.

Conclusions and Implications for School Mental Health

Notwithstanding the limitations of this study, the findings contribute to understanding of friendship quality of adolescents with ADHD. The results highlight the importance

of attending to the potentially exacerbating or attenuating effects of specific co-occurring symptoms (e.g., oppositional behavior, anxiety) on friendship quality. They provide preliminary evidence of social skills and social perspective taking as potential mechanisms underlying the association between ADHD, externalizing and internalizing behavior, and friendship quality. Accordingly, the results may inform assessments and school-based interventions designed to improve the social functioning of individuals with ADHD.

In qualitative studies, adolescents with ADHD report that educators, physicians and psychologists providing assessments and interventions typically do not attend to the issue that is most important to them having stable, supportive, high-quality friendships (Maya-Beristain & Wiener, 2020b). Consequently, psychologists, guidance counsellors and other adults concerned about student mental health should ask them about their friends including the number and characteristics of their friends, and the stability and quality of their relationships.

Consistent with the research showing that proximity and similarity are the mechanisms that typically lead to friendship acquisition (Bagwell & Schmidt, 2011), Maya-Beristain (2020b) found that adolescents with ADHD in secondary school typically had close friends who, like them, had ADHD or learning problems and whom they met when receiving special education support. Consequently, teachers should strive to place their students with ADHD in small groups with students who are compatible with them in terms of interest and personality. Although close friendships are linked to better psychological adjustment and socially isolated youth are at-risk for a host of adverse outcomes (Bagwell & Schmidt, 2011; Becker, 2012), friendship dyads where both adolescents have high levels of ADHD symptoms, oppositional behavior and conduct problems may engage in deviant behavior (e.g., Dishion et al., 2004). Furthermore, friends who both have high levels of anxiety may engage in co-rumination, which increases their anxiety (Rose, 2002; Rose et al., 2007). Consequently, educators and parents of adolescents with ADHD are encouraged to monitor the activities of adolescents with ADHD and their friends closely and intervene when problems arise.

The results of the current study suggest that targeted school-based interventions to increase friendship quality of adolescents with ADHD should specifically address social skills and social perspective taking. As reviewed by Wiener and Bedard (2021), Mikami and her colleagues developed the *Making Socially Acceptive Inclusive Classrooms* (MOSAIC) program, which involved training teachers in specific strategies (e.g., praise, modelling collaboration) designed to foster friendships in elementary school classrooms. Although these strategies were helpful in terms of improvement of relationships of children with ADHD (Mikami et al., 2019), the program would be very

challenging to implement in a middle or secondary school where students have several teachers. Consequently, interventions directed at adolescents with ADHD are more viable. The PEERS program is a social skills training program that explicitly involves teaching social skills to adolescents that was evaluated in a study with 11 to 16-year-old adolescents with ADHD (Gardner et al., 2019). Compared to baseline, following the intervention, parents and young adolescents reported that the adolescents acquired more social knowledge, and they got together with their friends more frequently. However, intervention effects were not found in relation to friendship quality, possibly because the skills needed for high quality friendships were not taught. Although more research is needed to establish the efficacy and effectiveness of mindfulness-based cognitive therapy in terms of improvements in friendship quality, initial results suggest it a promising intervention for adolescents with ADHD in terms of reductions in peer relations problems, and it increases in empathy and social perspective taking abilities (Haydicky et al., 2015, 2017).

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Data Availability Data are available by emailing the authors.

Declarations

Conflict of interest The authors have no conflicts of interest to disclose.

Ethical Approval Ethics Approval obtained from the Social Sciences Ethics Review Board, University of Toronto (PROTOCOL REFERENCE # 25468).

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